# Lagoon Pond Drawbridge Committee
# Minutes of the Meeting held on October 5, 2005
# At the Offices of the Martha's Vineyard Commission

Present: Melinda Loberg (Chair), Fred LaPiana, Tristan Israel, Steve Berlucchi, Mark London

Observers: Jo-Ann Taylor, Chris Fried, Bob Ford, Harriet Barrow, Dan Greenbaum, Ezra Blair, Srinivas Sattoor, Phil Hale, and Paul Norton (Lichtenstein Consulting Engineers)

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## 1. Independent Review of Existing Bridge

Paul Norton, Lichtenstein Consulting Engineers, appeared to discuss some of the findings of the consulting project, noting that the full report would be completed in about a week. As outlined in the study scope, they reviewed data, consulted with MassHighway, met with various committee members, and made a visual inspection during a site visit. The bulk of the work was to identify and assess possible failure mechanisms and to identify contingencies/repairs. Although the mechanical and electrical systems were not part of the scope, they commented on some of the systems in that they affected the operation of the draw.

Review of data and interviews

Overall, the bridge is in poor condition. The following are some highlights.

- The structure is moving "in a bad way". It is difficult to identify a consistent pattern of sinking or moving in a particular direction, and therefore difficult to predict future movement. Some points have moved as much as 5/8" in last few years. The bridge is still moving; four of the five sets of data are from since January 2003, i.e. after the stabilization repairs. The bascule toe has had a 2" transverse movement. The bridge tender reported that the bridge used to "wiggle" prior to the repairs but not since.
- Looking at the structure, it is clear that one end is lower than the other. There is a major crack at the end of the bascule that lines up with a crack in the pier cap. Also, there is a vertical misalignment. The bascule pier tends to want to fail. The cables of the constraint system are not overly taut nor ready to pop.
- Borings show evidence of some peat, but no defined peat layer. As a base, peat has a high moisture content, a high capacity for compression, and a low load-bearing capacity compared with sand, although there can also be problems with a sandy layer. (MassHighway had previously implicated a peat layer in a possible scenario of a catastrophic failure.)
- The restraint system added several years ago is helping reduce the bridge movement and is not beyond its useful life.

Failure Mechanisms

The consultants identified 12 possible failure mechanisms, ranking them as high, moderate and low and also rating the possible consequences of failure. Half the mechanisms are structural, half

are related to operating the bridge. The two highest-risk ones are the concrete deck slab of the approach spans and the bascule span joints.

- The concrete deck slab of the approach spans is at a high risk of failure.
  - The major cracks at the tail of the bascule piers and the cracks in the pavement indicate stress points and line up with the pier cap on the right hand side.
  - A small or large hole could open up, possibly from a large load crossing the bridge, and then get bigger.
  - It might also be possible to take off 2½" of asphalt and 2" of slab and reinforcing bars under that, then add 5" steel grates and fill them with concrete; this might be able to be done one lane at a time; however, he would be concerned about the added weight. He also doesn't think that it would be prudent to replace the slabs on the 75-year-old timber piles given the problems with the pile caps and his concern about the structural integrity of the piles.
  - Theoretically, based on the visual inspection ratings, the piles should be able to handle the weight in that the visible caps and timber are strong. However, however he is concerned that the pilings might be compromised at a stress point perhaps 10-15' below the mud surface, which would not show in the inspection reports. He thought that the lower parts of the piles are fixed in the ground and, as the bridge moves, the piles are further weakened at those stress points. It is theoretically possible to reinforce the piles with battered piles.
- The bascule span joints are also at a high risk of failure.
  - This is critical because the Coast Guard's position is that navigation has right-of-way. The water was there first and a bridge is only there as permitted, with openings per permit. So if even only one boater complains, the Coast Guard would require the span to be kept open.
  - The span could be cut again, as was done a few years ago, and more in the future. It has moved 3/8" in two years so cutting 1"might extend the bridge's life by as much as five years. Cutting would not speed up the movement of the structure.
- Other moderate and low failure risks (partial list), some of which could easily be fixed are the following.
  - Sidewalk or railing failure
  - Structural failure of concrete pile caps
  - Bushing failure (could lead to serious problems with mechanical operation)
  - Operator house framing (needs repairs)
  - Span reducer (gear box)
  - Mechanical drive shaft deteriorated
  - Electrical controllers (animals getting in)

Other Issues and Questions

- Load and speed limits: As preventative measures, reducing the load and speed could help extend the life of the bridge. Changing the posted load to 3 tons would pose a problem

for buses and emergency vehicles. The limit could be set at slightly more than a bus or fire truck. To help enforce the posted load limit, a "headache bar" could help with enforcement; this is a light truss set away from the bridge supporting chains that would be hit by large trucks.

- Non-motorized opening of the draw: If the draw is not operational but is kept open for vehicular traffic, could the draw be opened to boats in a weather emergency without motorized means? Response: There is a span drive that could be operated by manpower with a lever, but the mechanism may not be functional and may have been partly decommissioned. It wouldn't work if it were the bushings in the bascule span joint that failed.
- Lifespan of bridge: Although this was not part of his mandate, what does he think is the likelihood that the existing bridge will last 6-8 years (the time required to build a permanent bridge)? Response: He doesn't think the bridge will last that long, even with the repairs outlined in this report. Members of committee stressed the need for the report to relate the various assessments to the timeframes for completion of the temporary and permanent bridges.
- Inspections: MassHighway now visits the bridge every six weeks, which is a high level of attention.
- Follow-up: The Committee discussed the possibility of meeting MassHighway to discuss the final report. At that time, we could discuss, among other things:
  - A program of preventative repairs and maintenance.
  - What is the back-up system for opening the bridge in case of mechanical failure?
  - What steps need to be taken, and by whom, to get enforcement of speed and weight limits as soon as possible?

## 2. Next Meeting

Tentatively set for Wednesday, October 19, 2005 at 9:00 a.m. provided that the reports have been received and distributed prior to that date. [Note: subsequently changed to October 21.]

*Minutes prepared by Jo-Ann Taylor and Mark London.*

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